



Fact Sheet

Defense Advanced Research Projects Agency

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IMMEDIATE RELEASE

August 2004

Optical and Radio Frequency Combined Link Experiment Program

The Defense Advanced Research Projects Agency (DARPA) is developing a new and exciting communications capability through the Optical and Radio Frequency (RF) Combined Link Experiment (ORCLE) program. This program will develop and demonstrate a prototype system that combines free space optical and RF communications into a single networked system to provide compact, robust, high-bandwidth, mobile communications to military forces.

ORCLE is a revolutionary approach to communications that will combine the high-data rate capability of laser communications, the high reliability of RF communications, and clever network management to ensure high quality, reliable networked communications, even if some of the links are affected by atmospheric or physical obstructions.

The main effort in phase I of the program is to develop a prototype system and conduct flight demonstrations of hybrid Free Space Optical (FSO)/RF air-to-air-to-surface links that combine the best attributes of both technologies. The technical focus will be innovative hybrid networking and link technologies that exploit FSO/RF channel diversity and synergy to yield higher performance than either FSO or RF alone. Larger networks using ORCLE technologies will be simulated to assess protocols, scalability and performance of the hybrid FSO/RF concept. Additionally, high-data rate modulating retro-reflector (MRR) technology will be incorporated into the flight demonstrations to show the possibility of expanding optical network connectivity to smaller, less capable platforms.

Lockheed Martin, Akron, Ohio, is the ORCLE system integration program prime contractor, leading a team that includes ITT Industries, L3 Communications Corp., BAE Systems, Adaptive Optics Associates, Accipiter Systems, EMS Technologies, Dayton Aerospace, and Rockwell Systems. Lockheed Martin received phase 1 funding of \$15,535,337 (contract FA8650-04-C-7108 awarded on April 9, 2004). The contract calls for a range test in approximately 18 months (phase 1) and includes an option for a flight test after 30 months.

In addition to the ORCLE system integration effort, there are a series of technical maturation efforts designed to investigate the technologies that will facilitate the transition of

ORCLE to the military for operational employment. The contractors developing these technologies are:

- ATK Mission Research Corp., Santa Barbara, Calif. – combined RF & electro-optical aperture for high data rate and robust communications (\$2,896,685 awarded under contract FA8650-04-C-7116 awarded on May 18, 2004)
- Rockwell Scientific Co. LLC, Thousand Oaks, Calif. – transmissive liquid crystal optical phased array for optical communications (\$565,810 awarded under contract FA8650-04-C-7109 on April 19, 2004)
- Rockwell Scientific Co. LLC, Thousand Oaks, Calif. – adaptive spectral encoding transceiver modems for free space optical communications (\$1,522,143 awarded under contract FA8650-04-C-7110 on April 21, 2004)
- Epitaxial Technologies LLC, Baltimore, Md. – preamplified photoreceiver and active modulating retro reflector array (\$758,503 awarded under contract FA8650-04-C-7117 on April 19, 2004)
- AOptix Technologies Inc., Campbell, Calif. – secure wireless airborne transmission through turbulence (\$1,733,996 awarded under contract FA8650-04-C-7118 on April 21, 2004)
- Pennsylvania State University, University Park, Penn. – optical wireless communications using ultra short pulsed lasers and pulse shaping (\$570,768 awarded under contract FA8650-04-C-7114 on May 10, 2004)

“ORCLE promises a huge increase in the amount of information available to the warfighter on the battlefield. A reliable, high-data rate, timely means of taking this information from its source to the person needing it is one of the weakest links in the chain. ORCLE promises to be a major step in strengthening this link,” noted Stephen Griggs, DARPA’s ORCLE program manager.

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